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AMERICAN VETERINARY REVIEW,

SEPTEMBER, 1877.

ORIGINAL ARTICLES.

A CONTRIBUTION REGARDING THE SEPTIC DECOMPOSITION OF THE BLOOD.

By PROF. E. SEMMER, of the Royal Veterinary Institute of Dorpat, Russia.

[Translated from the German (Virchow's "Archiv für pathologishe Anatomie," 67 vol., 3d part, page 371), by F. S. Billings, of Boston, Mass., for the American Veterinary Review.]

Septic decomposed blood is characterized in general by its dark, brownish black, or changed color, its abnormal thick consistency, and its non-ability to coagulate; through the numerous ecchymosis found in different parts of the organism, the serous cavities of the body are found more or less filled with a yellowish, or reddish transudation, the intestinal mucosa is more or less affected, and the cadaver rapidly becomes decomposed. In the blood are to be found suspended numerous bacteria, representing the micrococcus, streptococcus, microbacteria, streptobacteria of Billroth. The red blood cells are found in a state of dissolution, sometimes almost entirely absent immediately after death, the serum of the blood is brown colored. The putrid decomposition of the blood is to be distinguished from that following fully developed septicaemia by the following characteristics. By the putrid blood-intoxication we find micrococcen and streptococcen ("Kugel und Kittenbacterien), Fig. 1 and 2, by completely developed septicaemia, on the contrary microbacteria and streptobacteria (Stäbchen und Fadenbacterien,") Fig. 3 and 4.

Anthrax (charbon) bears the strongest resemblance to septic blood decomposition. By anthrax we find dark blackish brown, tar-like blood,

ecchymosis, gelatinous bloody infiltration, on different parts of the organism, and intestinal affections. The blood of anthrax contains, however, the bacteria characteristics of that disease, baccillus anthacis (Koch), which fail by septic and putrid diseases of the blood. Brauell and Davaine have also noticed this point of difference.

Some authors have unjustifiably identified anthrax and septicaemia (Ravitsch). A further difference between anthrax and septicaemia is, that we can always generate the latter artifically, which has never been successful by anthrax. We can produce a putrid decomposition of the blood from injection of foul material, or from foulness bacteria, in the circulation, or introducing such elements subcutaneously, which, if the animals do not die too quickly, will produce developed septicaemia. Putrid blood, and especially septic blood, as also that from anthrax individuals, is exceedingly contagious. The contagion of septicaemia can be generated from fouling elements, in living blood. The causes of anthrax are, without doubt, to be sought in the decomposing elements of organic substances, or living organisms of the lowest order, the early stages of whose development take place outside of all animal organisms.

Putrid, and especially septic bloods, are especially contagious, and in such are to be found intra vitam micrococcen, streptococcus, etc.

The intensity of septic poison increases from generation to generation, by means of repeated inoculation, as was shown by a series of experiments at Dorpat in 1869, and by Davaine in 1872; also receiving confirmation from Magendie, Cone, Sanderson, Klein and others. Like increase of the intensity of the contagion from generation to generation has not been confirmed by anthrax.

As by anthrax, so by typhus of the horse (febris putrida, purpura hemorrhagica, foul fever), the blood is found to be miscolored, blackish brown, and microbacteria have been found in the same (Fig. 11).

[NOTE.—Röll, of Vienna, in his "Lehrbuch der Pathologie und Therapie der Hausthiere," classes this disease with anthrax, and speaks of the presence of bacteria in confirmation of this opinion. English authors do not seem to have examined the blood carefully of such patients, and it would seem well worthy of attention to prove if it be so or not. I have personally examined the blood of some eight cases this spring, very carefully, from day to day, and found none, nor have other fellow students been more successful, and it seems to be very questionable if this little understood disease should at present be looked upon as one of anthracic form. If the bacteria are present at all, it is only during the last stages of life, and all observers should be very careful about reporting bacteria found post-mortem, especially if organic foulness has set in.—*Trans.*]

Rabies by the herbivora bears a strong resemblance to septic blood

decomposition. By the dog the resemblance is very slight. Rabies in dogs is characterized by the presence of gastro-enterical catarrh, foreign substances in stomach, capillary stasis, and encephalic edema; the saliva and blood contain a very fine variety of micrococcus and chain-bacteria (Fig. 6). The encephalic edema is more marked by dog distemper; one finds constantly a patial broncho-pneumonia, with serous, or fibrinous, or suppurative infiltration of the affected parts of the lungs. By the distemper are to be found in the blood, the liver and kidneys, fine granular micrococci, out of which, under circumstances, develop very delicate microbacteria, which are very much smaller than the baccillus anthacis of anthrax (Fig. 7). By eight cattle dissected by me, which had died from rabies, the blood was found to be miscolored, brown red, the intestinal mucosa markedly reddish and swollen, the encephalon correspondingly edematous, in the ventricles much reddish transudate, ecchymoses on various portions of the organism, in the blood, besides micrococcen and microbacteria, a spermatazoa like variety (Fig. 8).—(Helobacteria, Billrath.)

The same result was obtained from a wolf which died of rabies, with the exception of the above-mentioned "helobacteria." By 50 rabid dogs dissected by me, I found only 2 which presented phenomena resembling those common to septicaemia.

Regarding putrid and septic diseases of the blood, the greater contingent for the same is to be found in gangrene, and ulceration in consequence of outward injuries, fractures of bones, injuries to joints, and the reception of the ichor from the same in the circulation; next to these the infection from septic and putrid substances of every variety. The septic decomposition of the blood by animals has still other sources.

From the investigations of Bollinger and Roloff it is proven that the so-called calf and lamb fever of new born animals (why not of foals also?) is a disease of the blood, owing to septic decomposition, caused from a putrid inflamation of the umbilicus. This inflammation has its primary cause in pollution of the umbilicus of the new born animal from stable filth, and insufficient cleansing of the body. According to my 12 years' experience, and dissection of over 1,500 animal cadavers, which had died from all manner of causes, I look upon the following as among the causes of septic decomposition of the blood:

Puerperal fever is often of a septic nature by animals. We find in the blood of animals which have died from this disease, immediately after death (should be also examined immediately before, or during the

agony), putrid micrococcen, chain-bacterias, or septic, micro and streptobacteria. In such cases, we find ichorous masses in uterus, and at the same time injuries of the uterine mucosa, or ichorous diptheritic inflammation of the uterus. The reception of the putrid elements from the uterus into the circulation is, in this case, the cause of the septic puerperal fever.

A further source for septic decomposition of the blood is to be sought in the so-called flatulent colic, especially by horses. Here accumulates the gases (CO_2, H_2S and others) in the stomach and intestines in great quantities, so that the abdomen is distended, the diaphragm pressed forward into the thorax, and the respiration disturbed. The noxious gases become absorbed by the blood-vessels, and the reception of oxygen by the lungs hindered. The animals die from asphyxia, with blood poisoning also at some time from the noxious gases. By the obduction, the stomach and intestines as found distended by gases, the intestinum crassum inflamed in most cases; but we do not always find volvulus with gangrenous necrosis of the volvulated intestines, but often rupture of the intestines or of the stomach, and emptying of their contents in the abdominal cavity with peritonitis. The blood is, in all cases, of an abnormal color, dark blackisk brown, and contains septicbacteria; the red blood cells are in process of disintegration. That the above is the nature of the blood, very often in cases where neither gangrene or rupture has taken place, is well known; so we must look for other sources for the septic decomposition than gangrenous or ichorous centres.

The same comes to pass even more markedly by animals which have been overheated or overexerted, which die suddenly therefrom, or gradually die from asphyxia. By such animals the blood is found to be tar-like, and also contains microbacteria. Here the oxygenation by means of the lungs is insufficient for the wants of the organism, or to equalize the decomposed materials caused by the severe muscular action. The latter accumulate in the blood, and septic decomposition takes place from want of active oxydation of the same.

The same processes take place in many cases from suffocation in consequence of lung and heart diseases, or chronic poisoning from narcotic substances.

The want of oxygen and especially ozon gives a favorable opportunity for the development of septicbacteria. The latter being found by obductions immediately following death, we have not to do in these cases with first mortal blood changes; the named characteristic phenomena fail by animals which have met their death from other diseases.

From this we may conclude that the putrid and septicbacteria find in such blood conditions very favorable to their development. The intestines and liver must be looked upon as constant sources for bacterian emigration, as we must meet them there by healthy individuals. Experience has taught that small quantities of foul material containing bacteria can be brought into the circulation of healthy animals without evil consequences. The same are disturbed in the circulating blood. Greater quantities of noxious elements taken from the intestines into the blood can bring on death through septicaemia. If, as shown by Bollinger, myself and others, the bacteria can cause the death of the animal by asphyxia, through the withdrawal of the oxygen, as takes place by anthrax, yet it does not appear to be the case by septic and putrid bacteria. The latter develop from the want of oxygen in the blood, and appear to work especially upon the red blood cells, and to cause an immense disintegration of the same.

The bacteria of other contagious diseases die from want of oxygen in the blood, they soon die when foulness begins in the cadaver, and are replaced by foulness bacteria (anthrax distemper, rabies, rinderpest, etc.) Another source for putrid bacteria is to be found in blood transfusion. Aside from the fact the blood from animals of other species becomes decomposed in the circulation, and is excedated by means of the kidneys, comes here in consideration the fibrinferment discovered by A. Schmidt, by means of the latter is caused coagulation, stosis and thrombosis. (Köhler, über Thrombose, und Transfusion, Eiler, und Septische Infection, und deren Beziehungen zum Fibrinferment. Dorpat, 1877.) True putrid decomposition of the blood can take place by means of transfusion.

In spring of 1875 the blood and milk from an old cow suffering from tuberculosis was injected partly in the veins and partly subcutaneous of thirty young pigs and lambs by way of experiment. The quantity of blood and milk amounted to one fifteenth to one thirtieth of the total amount of the blood of the above animals. The above quantities of blood and milk was borne by the animals in question without apparent prejudice. The infusion took place in pure air from one to one and a half hours after the withdrawal of the blood with disinfected and perfectly clean instruments. The blood was previously defibrinated, but not warmed; the milk was also not warmed. Of the thirty animals, eight died partly from hydrops, partly from other accidental causes. Sixteen of them were killed six months after the infusion, and showed fully developed tuberculosis. Two young pigs were brought into a room filled

with air impregnated with foul elements, and the infusion took place one hour after the blood was taken from the cow. One of them died three days, the other five after the infusion took place. Both manifested septicaemia in high degree. The same blood which was injected into the other animals in the pure air, and caused no disadvantageous conditions, by these, where the operation took place in polluted air, caused septicaemia and a rapid death. Two rabbits were subcutaneously injected with blood from a horse which had been inoculated with glanders four days previously. The blood was previously to injection brought through a room the air of which was polluted with foul elements. Both died after eighteen and twenty-four hours, and presented the phenomena of fully developed septic and putrid blood decomposition. The blood of the rabbits examined immediately after death contained scarcely any red cells, only detritus masses of the same, and a great many micrococcen and streptococcen, which must also have been present intra vitam, so many being present when the obduction was made which immediately followed their death.

If the examination of the blood of animals suffering from putrid or septic decomposition of the same, does not always show bacteria intra vitam, the same does not prove that they are absolutely absent. The same may be disturbed by means of the active oxydination taking place in the circulating blood. It is easily supposable that the same may be filtered from the blood by means of the liver, kidneys and spleen, and yet they may increase, and periodically appear in the circulation in great numbers, until they finally gain the upper hand, and are able to so carry on the work of disintegrating the red cells. The circumstances that foulness bacteria very often develop in the cadaver very rapidly, and cause the disappearance of those peculiar to certain diseases has often led to many false conclusions. It is entirely wrong, as may be asserted, that there is no difference between the bacteria met with by different contagious diseases, and that the same are exclusively the consequence of the disease—only gradually varying according to the disease, and species of animals.

As examples of the specific forms of bacteria by single diseases, I quote cattle. By the same we can distinguish—putrid bacteria, Fig. 1 and 2; septic bacteria, Fig. 3 and 4; rabies bacteria, Fig. 4; anthrax bacteria, Fig. 5; rinderpest bacteria, Fig. 9. The bacteria by the rinderpest were constituted by me in 1871. (Wiener Vierstelfahrschrift, 1871, Bd. 36, S. 176), then from Klebs and Hallier, and again more exactingly treated by me in 1875. (Ueher die pathologische anatomie de Rinderpest Dorpat, 1875.)

The bacteria of anthrax are exactly alike in all species of animals. The same is true of the so frequently present putrid and septic bacteria.

The number of bacteria present by acute contagious and infectious diseases is generally considerable. (The same is true of anthrax, rinderpest, variola, cholera, F. recurrens). By chronic contagious diseases, as tuberculis, glanders, syphilis ; the number of bacteria present is less, and appear to attach themselves mostly to the white blood cells.

Although the bacteria of glanders, Fig. 10, bear some resemblance to those of syphilis, yet both diseases are essentially different. Inoculating experiments with syphilis on animals have produced only negative results. Glanders however is not only communicable to men, but also to carnivora, herbivora, and especially rabbits.

All contagiums are disturbed by foulness, and the bacteria peculiar to each contagious disease, vanish with the beginning of foulness, and are replaced by foulness bacteria, which may be looked upon as weeds, by which the delicate organism present in the cadaver, are soon overrun, and forced out of existence.

Fig. 1—Foulness bacteria. Fig. 2—Bacteria by Putrid Blood Decomposition. Fig. 3—Bacteria by Septic Decomposition. Fig. 4—Bacteria by Septicaemia. Fig 5—Bacteria by Anthrax. Fig. 6—Bacteria by Rabies. Fig. 7—Bacteria by Dog Distemper. Fig. 8—Bacteria by Cattle Rabies. Fig. 9—Bacteria by Rinderpest. Fig. 10—Bacteria by Glanders. Fig. 11—Bacteria by Typhus.

PERIOSTITIS.

By A. A. Holcombe, D. V. S., N. Y.

[*Continued from Page* 149.]

In so far as we have observed, the Veterinary works in the English language are almost entirely destitute of any information concerning the disease of which we are attempting to treat, and the profession will appreciate the difficulties to be overcome, and the inevitable errors which will occur, in the exposition of periostitis as it occurs in the different parts of the entire osseous system, by one who has seen so limited an amount of practice. In treating of this disease as it occurs in different parts of the body, we have thought it best to consider the regions in the order of their most frequent seat of occurrence.

It is the long bones which, as a rule, are subject to the acute form of periostitis, hence their consideration will be left until the last.

The short, flat, and irregular bones being usually the subjects of the chronic form of this disease, will be divided into six different regions.—1st, the phalanges; 2d, the tarsus; 3d, the carpus; 4th, the inferior maxilla; 5th, the vertebral column, including bones of the head; and the 6th, comprising the scapula, sternum, ribs and pelvis.

PERIOSTITIS OF THE PHALANGES.

Inflammation of the periosteum covering the last phalange, or os pedis, is due, in the majority of cases, to traumatic influences, as punctured wounds, toe-crack, quarter-crack, concussion, &c., yet it is sometimes met with as an accompaniment of disease of the neighboring joints and contiguous tissues. While punctured wounds of the feet are seldom seen in the country, nothing is more common, especially in the spring of the year, than the picking up of nails in the streets of our cities, and although the wounds at the time may seem trivial, they are often followed by untoward consequences, as will be attested by every practitioner, and perhaps especially so by our friend Mr. McInnes, of Charleston, South Carolina, who reported in the *Veterinary Journal* for March, 1876, some twenty-five cases of tetanus as the result of punctured wounds.

Any instrument perforating the walls of the foot and wounding the bone must of necessity be followed by a more or less circumscribed

periostitis and superficial ostitis. It is not necessary in every instance that the periosteum be wounded to produce an inflammation of its substance, for from the intimate relation which it bears to the surrounding parts, it may become inflamed in consequence of the diseased condition of the contiguous soft tissues, as in acute laminitis, arthritis, or the pressure from keratoma.

But when the tissue has been wounded, the damage cannot be repaired except through the inflammatory process, and although this process is generally reparative in its tendencies, it may assume the destructive form, and the complications and terminations be anything but desirable.

The serious consequences resulting from punctured wounds of the feet depend upon the seat of the wound, and the amount of injury done the tissues.

If the instrument causing the wound be small, and the injury inflicted but slight, the process necessary to repair the damage is, of course, quite limited; but if the puncture is made by a large instrument, or the tissues are deeply perforated, then does the destruction of tissue become greater, and the consequent disease proportionate. Wounds upon the lower part of the wall, and in the anterior portion of the sole of the foot, are of less consequence than those in the neighborhood of the joints. The injury in the former class of cases is, as a rule, quite limited, although there may be fracture, with its attendant serious consequences, but mostly there is only a circumscribed inflammation of the tissues with or without suppuration, which, if properly and early treated, ends in a short time with complete recovery, and the animal can again be put to his accustomed work.

Shoeing-smiths, in their attempts at bleeding from the toe, and treating of nail-pricks, sometimes succeed in presenting the Veterinarian with an interesting case of suppurative periostitis, where, had the tissues been given relief in exudation by a free and judicious use of the knife, would have terminated at most in a moderate amount of villitis. To those wounds situated in the immediate locality of the frog, and especially those through the cleft, as well as the ones seen upon the superior anterior portion of the wall from the sharp calks of the shoes in winter time, must there always be more or less grave importance attached. A punctured wound of the sole near the last phalangeal articulation, even when slight, is prone to be followed by periostitis and synovitis, in which the attachment of the flexor pedis perforans takes part.

It is these wounds occurring near the heel, where the nail or other

instrument perforating the tendon fractures the navicular bone, and guarantees permanent lameness, if not a fatal synovitis.

The majority of wounds which we see upon the front of the hoof just below the coronet are not deep, neither are they accompanied with even a moderate amount of lameness; yet, there are occasionally instances in which the newly sharpened calk will penetrate so deeply as to wound the tendon of the extensor pedis at or near the point of its attachment upon the pyramidal process of the os pedis, and it is in these cases you will see acute and permanent lameness from inflammation of the wounded tendon which may be accompanied by synovitis, periostitis, ostitis, and rarely caries of the pyramidal process.

There are some horses with the habit of standing with the heel of one hind foot resting upon the upper portion of the hoof of the other foot, and during the winter months they may keep themselves continually lame from irritating a previously received wound of the above character, by their reprehensible practice of standing cross-legged.

SYMPTOMS AND COURSE.

All punctured wounds of the foot are not followed by periostitis, and usually it is only those in which the wound is extensive, or the periosteum directly injured, that inflammation of this tissue supervenes. If the animal is known to have picked up a nail, the foot is generally allowed to go unattended, or at most stuffed with oil-meal at night, until lameness sets in, when the smith pares the horn around the seat of the wound and the patient is returned to work. If the wound has been slight there may be no lameness following it whatever, but usually the horse is sent to you a week or ten days after the injury with acute lameness from suppuration unrelieved. The wound, which would have recovered in a few days' time from judicious treatment, becomes one of importance by reason of the neglect; the inflammation which was at first confined to the podophyllous, or to the velvety tissue, extends to the periosteum, and suppuration takes place between the outer and inner layers of this membrane, and unless relieved extends over the entire sole. There are other cases where no wound can be found, the puncturing instrument being so small as to leave no detectable evidence of its passage through the horn, and although the animal is lame, you may not be able to make a correct diagnosis until suppuration has taken place, and the presence of the pus is detected beneath the horn. If the substance of the bone has been wounded, you will have the most acute lameness from the moment of the injury, superficial ostitis setting in with acute suppurative periostitis.

The suppuration takes place beneath the true periosteum upon the surface of the bone, and separating the two, the periosteum is to an extent destroyed. The lameness at this time, even where the horn has been completely pared away, is so great as to prevent entirely the use of the foot, it being continually raised from the floor, and allowed to bear none of the weight of the body even during locomotion, the animal preferring to hobble along on three legs. In noting the constitutional symptoms you will find an elevated temperature, a quickened pulse and respiration, and sometimes a loss of appetite; the mucous membranes will be slightly injected, and the animal persist in standing. These cases usually lose flesh very rapidly, especially where synovitis is an accompaniment. After the pus is allowed to escape, where periostitis without synovitis is present, most of the cases will do well; the denuded bone becomes covered with the granulating soft tissues, which eventually replace the destroyed periosteum, and as the inflammation subsides, the tissues, which have been greatly swollen, become gradually reduced and finally covered with new horn. The lameness improves as the recovery progresses, and the constitutional symptoms disappear as the suppuration terminates. In those cases where synovitis is present the suffering is still more acute than in the cases previously mentioned, for, as a rule, all food is refused, and the patient rapidly runs down in flesh, and if suppuration sets in he may die of pyæmia. But even where the case does not terminate fatally, anchylosis of the joint is almost sure to follow, leaving the patient a permanent cripple. The presence of suppurative synovitis will be easily made out by the character of the discharge, there being mingled with the pus a large amount of synovia, streaked with more or less blood.

Where fracture of the os pedis exists as the result of a puncture, and you cannot detect it with your probe, you will suspect it from the long-continued and acute lameness, or from the callus formed in the reunion of the parts. There is yet another course the processes following an inconsiderate puncture may take, which, although not common, is very interesting, and that is, where the lameness is slight from the commencement, and continues for months without getting better or apparently worse. It is in these cases that a chronic periostitis exists, and a deposition of lime salts takes place around the attachment of the flexor tendon, the lameness being permanent from the interference with the action of the joint.

[TO BE CONTINUED.]

ANATOMY OF REGIONS.

Translated from Peuch and Toussaint's, Précis de Chirurgie Vétérinaire.

By A. Liautard, M. D. V. S.

[*Continued from Page* 159.]

SECTION 3.—REGION OF THE NASAL FOSSAE AND OLFACTORY APPARATUS.

As indicated by its name, the olfactory apparatus serves to the perception of odors; it is besides that the anterior part of the respiratory apparatus. In horse, whose velum palate is very long, it constitutes the only possible passage for the entrance of air into the lungs.

The nasal fossae represent two symetrical canals, elongated according to the great axis of the head from the nostrils to the pharynx, and separated by a median bony, cartilaginous septum. Their bony walls are formed by the nasal, superior maxillary, ethmoid, turbinated, frontal, palate and pterygoid bones.

Each cavity has the form of an elongated tunnel with an *anterior* and a *posterior opening*, *two lateral walls*, a *roof* or *arch*, a *floor*, a *posterior chamber*, the *septum* which separates them, the *mucous membrane* which covers all these parts, and at last *blood vessels and nerves.*

The *anterior opening* is flattened sideways; it has for wall outwardly the inferior extremity of the maxillary turbinated bone, divided in two branches—the inferior covers the ascending apophysis of the small maxillary—the superior has a movable, cartilaginous skeleton, easily felt when the finger is introduced in the nostril; it is covered by the skin, and prolonged by a peculiar thick fold which separates it from the false nostril; and is continued with the superior extremity of the internal lip of the nostril.

The *posterior opening*, also called guttural, is about quadrilateral, slightly elongated in the direction of the axis of the head, with round angles; it is divided in two parts, corresponding to the two nasal fossae, by the border of the vomer which supports the median septum. The palate and pterygoid bones circumscribe it outwards. Formed by bony walls it is not susceptible of expansion. The inflammation or thickening of the mucous membrane can alone influence its diameter by narrowing it.

The *lateral walls* are one internal, formed by one of the sides of the median lamella, flat and smooth; the other external, very anfractuous, formed by the internal face of the great maxillary supporting the turbinated bones.

These *turbinated* are two in number, the supero-anterior or *ethmoidal*, and the infero-posterior or *maxillary*. Both are formed by a bony lamella, twisted upon itself in opposite direction, and in such a way that the longitudinal slit, which gives entrance in their interior, is situated in the middle meatus; they are wider at their superior extremity; and in all their extent slightly flatten from side to side. Both are divided in two parts by a transverse bony plate; the superior part communicates with the sinuses, the inferior subdivided into several lodges open into the nasal cavities. Both at last are prolongated inferiorly by a fibro cartilage and mucous folds uniting them to the wings of the nostrils.

The bony frame of the ethmoidal turbinated bone is longer than that of the maxillary; the contrary exists for the cartilaginous portion. This one has no connection of continuity with the ethmoid, while the former is, so to speak, the most anterior volute of that bone. The superior cavity of the ethmoidal communicates with the frontal sinus, that of the other with the inferior maxillary sinus. At last, the cartilaginous appendix of the maxillary turbinated bone is always divided in two portions, the anterior of which is directly in continuation with the internal wing of the nostrils; the cartilaginous portion of the ethmoidal turbinated, almost always single, disappears before reaching the nostrils.

The turbinated bones are separated from each other, from the roof and floor of the nasal cavities, by very narrow spaces called *meatus*. The *superior or anterior meatus* is the narrowest; its anterior wall is formed by the roof of the cavity. The *inferior or posterior meatus* extends from the maxillary turbinated to the nasal floor. The *middle meatus*, situated between the two turbinated, has towards its middle a slit, sometimes a foramen, opening into the maxillary sinuses; it is also in this meatus that open the anfractuous cavities of the turbinated bones.

The *ceiling*, or *roof*, limits forwards the superior meatus; it is hollowed, curved gutter-like shape towards its superior extremity, which extends as far as the cribriform plate of the ethmoid, that is, far behind the posterior border of the guttural opening. The straight portion of its course has for base the nasal bone; the curved portion is excavated

in the frontal and ethmoid bone—the former is wider than the second, which terminates into a very acute angle.

The *floor*, wider but shorter, has for base the incisive process of the small maxillary bone, the reflexed portion of the great maxillary and the palate; it forms the posterior wall of the inferior meatus. Altogether, in front of it, one will find the entrance of the canal of Jacobson, and the inferior opening of the lachrymal canal, pierced on the boundaries of the nostrils and nasal cavities.

Posterior Chamber of the Nasal Cavities.—Behind the posterior border of the naso pharyngeal opening, there is an elongated diverticulum, some five centimeters in length,* and situated between the internal plate of the frontal, the cribriform sheet of the ethmoid and the sphenoid. This space is filled by the ethmoidal volutes and the superior extremity of the anterior turbinated bone—the volutes are formed of bony sheets rolled upon themselves, and covered by the nasal mucous membrane. They are attached above upon the cribiform plate, their inferior extremity ends into cul de sac folded outwards to implant themselves upon the external plate of the bone.

Between the lateral masses of the ethmoid and the bony walls surrounding, there are narrow spaces where a somewhat considerable quantity of thick mucosities are always found.

Let us now consider the *septum* which separates the two nasal cavities. It is nothing else but the perpendicular lamella of the ethmoid, continued forward by a more or less ossified cartilage; almost always do we find a nucleus of ossification at the inferior and anterior part, on a level with the apex of the nasal bones. This nucleus, already wide in adults, extends with age, as often in old individuals, it unites above to the plate of the ethmoid, and thus is the septum almost entirely bony. The posterior border of the septum is rounded and implanted in the fissure of the vomer; the anterior rests upon the suture of the nasal bones; it expands on each side under these bones, which it separates from the mucous membrane of the roof. Its anterior extremity supports the cartilages of the nostrils. The faces are flat and form the internal walls of each nasal cavity; they present specially above a number of furrows for the divisions of the rich venous plexus of the mucous membrane.

The thickness of the perpendicular septum varies much; the median portion is always thinner than the anterior and posterior borders;

* Two inches.

of these two, the one corresponding to the vomer is the widest; the thinnest part is at the union of the anterior and middle third.

Let us see now the *mucous membrane* of the nasal cavities, the *pituitary*, or *Schneiderian* membrane, as it is also named. It covers all the organs spoken of, is continued to the skin at the anterior, and with the pharyngeal mucous membrane at the posterior opening. After covering the median septum, it reflexes itself into the meatus, lays upon the turbinated bones, lines their internal cavities, and surrounds, on both surfaces, their spiral frame; it even runs through the opening of the middle meatus, and lines the cavities of the sinuses. But in passing from one of these parts to another it undergoes important changes which we must know.

The mucous membrane of the perpendicular septum is thin all over. It is the thickest in the whole extent of the inferior extremity, where numerous mucous glands are found, with their orifices easily seen with the naked eye. Round the anterior and posterior borders, and near the inferior extremity, the mucous is much thinner, and shows plainly through its transparency the magnificent venous plexus underneath.

It is undoubtedly upon the cartilaginous portion of the turbinated bones that the pituitary membrane possesses its greatest thickness; it may, indeed, be about three or four millimeters; there, however, we find the same disposition as upon the perpendicular septum, the nearer the posterior chamber of the cavities the thinner it gets; specially is it so upon the superior turbinated; that of the inferior, looking towards the floor of the fossae has always a greater thickness.

The superior and middle meatus have a mucous membrane which is so thin that it has been sometimes taken for the periostéum.

In the inferior meatus, the membrane has about the same thickness as that of the inferior extremity of the turbinated ones. Its mobility is quite well marked.

The ophthalmic and nasal *arteries* carry the blood to the nasal cavities. The *veins* are more important than these blood-vessels; they possess numerous anastomoses and are without valves—a fact which allow of their injection through a large venous trunk—and which can be easily seen on a longitudinal section of the head, as there always remains a certain quantity of blood in the plexus which may be pushed in all directions by pressure of the finger.

Upon the median cartilaginous septum the veins form a handsome median network, composed of large trunks almost parallel, anastomosed and superposed in three, four or five layers, towards which converge

smaller, and equally anastomosing vessels, coming from the borders of the organs. At the anterior part, below the portion of the mucous membrane which is covered with glands, the veins, by their disposition, reminds one of the admirable venous network of the palate.

This disposition is more marked yet upon the turbinated bones, and especially over the cartilaginous section. Veins are more numerous upon the roof, and the posterior part of the floor, than in all the other points of the meatus. Those of the inferior turbinated bone are parallel to its direction; in the superior, parallel to its extremity and middle part, but converge together and unite to the nasal vein in front of the small ethmoidal volutes. In all the points where the mucous membrane is thick and loose, the veins occupy the underneath connective tissue, or rather form a second layer under the dermis; this disposition is well marked on the level of the cartilages. Everywhere, on the contrary, where this membrane is thin, and adherent to tissues underneath, the venous canal is made at the expense of the dermis alone, if resting upon cartilage, and partly in the dermis and bone if this tissue is covered by the mucous membrane. This disposition is well shown in a dry specimen, where the papyraceous sheath of the turbinated bones is covered with furrows, indicating the course followed by the veins. From the examination of this rich vascular network, the gravity of some epistaxis can be appreciated.

The *lymphatics* form upon the olfactory mucous membrane a beautiful superficial network, whose trunks run to the submaxillary ganglions, and during inflammation of the pituitary membrane, the ganglions are seen swelling to such a size as to sometimes fill the submaxillary space entirely, or even extend beyond the branches of the maxillary bone.

This is specially marked in diseases of the lymphatic system. We all know that one of the pathognomonic symptoms of glanders is the tumefaction of the sub-lingual ganglions when the pituitary is itself inflamed or ulcerated. This becomes, therefore, a means of the appreciation of deep glanderous chancres, that may escape detection by examination of the nostrils.

The *nerves* come from the first and fifth pair—the first seem to be essentially for olfaction, as their name indicate, and though cases of congenital absence of olfactory nerves not suspected during life, had been observed. M. Claude Bernard reports an observation which proves that olfactory nerves can be missing though the sens of olfaction be present. They are undoubtedly replaced by nerves of the third pair, which act also as nerves of the organs of smell.

The following are the average measurements of the nasal cavities on subjects of medium size:

Length of cavities, from anterior to pharyngeal opening	220	Millimeters.
" of posterior opening	65	"
Height, from the vomer to nasal bones, posterior part of the cavity,	95	"
" forward, perpendicularly from the nasal spine	75	"

Transversal cut at the first molar:

Width of inferior meatus	20	Millimeters.
Height " "	10	"
Distance from posterior turbinated to perpendicular septum	7	"
" " superior " " "	6	"

Sections at the guttural opening:

Width of inferior meatus	32	Millimeters.
Distance of inferior turbinated to perpendicular septum	11	"
" superior " " "	2	"

DIFFERENCES.—The nasal cavities of the ox are less spacious than those of the horse. The posterior opening is more elongated than in the horse, but not so wide; the transversal dimension is also smaller; and as their boundary lines forward and behind are far apart superiorly, their posterior chamber is about twice as large as the entrance of the cavities.

The turbinated bones are not disposed as in the horse. Truly speaking, there are three, as the ethmoidal volute is very large, and occupies posteriorly a space between the anterior and posterior turbinated.

This part of the ethmoid is named the *ethmoidal antrum*. The other turbinated bones have also a different form—the ethmoidal is very small, elongated, and attached to the bone proper of the nose; the maxillary turbinated is, on the contrary, much developed, and forms alone nearly the three quarters of the external face of the cavities; it is constituted by two bony lamella rolled in diverse directions, that is that rising upon the longitudinal axis of the organ, the anterior lamella is rolled forward, the posterior backwards. The bony frame of this turbinated bone is also much longer than that of the ethmoidal; its inferior extremity, entirely cartilaginous, extends down to the nostrils, and forms the frame of the internal wing. It results from this disposition that the position and form of the meatus are not like those of the horse,—the superior is, indeed, very small, and mixed near the nostrils with the middle one, which, quite wide forward, is very narrow behind,

and occupies the line corresponding to the union of the anterior and second quarter of the cavities. The posterior or inferior meatus is very large, and united with that of the opposite side in consequence of the disposition of the vomer, which, instead of resting upon the palate bone, as in the horse, unite to the floor of the nasal cavities only towards the inferior half of the maxillary bone. The floor of the cavities has, therefore, in the ox, a peculiar disposition, which gives it a bifurcated aspect forward.

The cartilaginous septum which separates the two cavities is thick, and possesses about the same width forward as backward, though its height is very great posteriorly—conformation which is a consequence of the special disposition of the vomer.

The mucous of the nasal cavities is much like that of the horse—like it, its thickness varies; very thin upon the bony part of the turbinated, it becomes very thick on the cartilaginous portions, as well as in the whole extent of the floor. The blood vessels are extremely numerous, and form a handsome network when artificially injected.

The nasal cavities of the *sheep*, *goat* and *swine* have much analogy with those of the ox; their length is in direct proportion to that of the face.

In *carnivorous* the nasal cavities are rather smaller, but their posterior opening is wide. The turbinated bones have a peculiar form. The ethmoid in these animals is very large, and the ossification of its middle septum extends always far down. The vomer has a special disposition; its two lamellœ are turned on each side so as to limitate, specially behind, a round or oval space, perfectly free, but whose walls are also formed by the floor of the cavities and the internal face of the maxillary bone. This double septum of the vomer divides each nasal cavity in two parts, one superior or anterior, which can be considered as the posterior chamber, one part posterior, the only opening allowing the passage of atmospheric air.

As to the inferior region of the cavities, it presents, as in other animals, the two turbinated separated by a middle meatus; the anterior turbinate or ethmoidal is very small; the maxillary, extremely complicated, is formed by *papyraceous* lamellœ rolled upon themselves, resembling the lateral masses of the ethmoid; its anterior extremity, single and cartilaginous, extends to the external wing of the nose. The superior meatus goes to the posterior chamber of the cavities, the inferior terminates directly into the special space situated under the lateral lamella of the

vomer. The middle meatus bends itself backwards beyond the maxillary turbinate, and terminates into the posterior opening.

The complicated disposition of the nasal cavities of the dog is in proportion to the development of the olfactory powers.

SECTION 4.—TIP OF THE NOSE.

This region is, indeed, but a portion of the superior lip, which, from its special use and organization, deserves a peculiar notice. It represents a quadrilateral surface, slightly hollowed in its middle; its excessive mobility allows the animal to alter its form in many different ways; it is the true organ of feeling of the solipeds.

The skin, covered with short, rough hairs, intermixed with others long, big, true tentacles, is very adherent to the sub-muscular layer constituted by the *middle anterior*, the fibres of the small super-maxillo-nasalis * and of the pyramidalis. The terminal aponeurosis of the great super-maxillo-labialis † separate these fibres from the skin.

The tip of the nose is a part excessively rich with blood-vessels and nerves. The arterial divisions are the superior coronary and inferior terminal branches of the glosso-facial, with the incisive artery formed by the anastomose of the two palatine arteries coming out of the incisive foramen. The nerves come from the superior maxillary: they run in large fasciculi towards the tip of the nose, hence their divisions can be followed to the internal face of the skin where they lose themselves. No part of the body possesses as much nerves as that region, and for this reason it is the most sensitive. Advantage being taken of that condition for the application of various means of restraint, which, by the pain they inflict upon animals, stupify them and render them less sensitive to the performance of simple operations.

SECTION 5.—SUPERIOR LABIAL REGION.

It is formed by the superior lip, movable organ, circumscribing above the buccnal opening, having a certain thickness, extending in front and upon the sides of the incisive arch and covered by two teguments; one external the skin, the other internal the labial mucous membrane, between which are found muscles, blood vessels and nerves.

The external surface of the superior lip is convex, covered with short and fine hairs, mixed up with long and coarse ones; the internal face is concave, smooth, always lubricated with secretion of the labial glands, which they pour over that portion of the mucous membrane.

* Nasalis brevis labii superioris of Percivall.
† Nasalis longus labii superioris of Percivall.

The skin of the lip is strongly adherent to the muscles underneath. Below the skin one finds the terminal aponeurosis of the tendons of the two super-maxillo-labialis and muscles, two aponeurosis losing itself in the obsicularis ovis.

The muscular layer between the teguments is formed by the superior portions of the orbicularis and the terminal insertion of the super-naso-labialis * and great super-maxillo-nasalis.† Between these muscles and the mucous, are found the muscular fasciculi, formed by the middle intermediate anterior muscle and a layer of yellowish small granules or glandular lobules, situated in the muscles or in the thickness of the mucous membrane.

The blood-vessels are terminal branches of the superior coronary, anostomosing with the division of the incisive artery.

The nerves are furnished through the facial to the muscles, by the superior maxillary to the skin and mucous membrane.

DIFFERENCES.—In bovines, the superior lip, called the muzzle, is less movable than in the horse; it is thicker and wider. The anterior face is hairless, or presents only a few, very fine but with large bulbs. The skin, then, has a peculiar aspect; it is rough, as if covered with small warts. It is hollowed in different directions by small fissures upon which numerous little elevations are found; these are pierced in their centre by a little orifice, excretory opening of racemous glands, secreting abundantly a peculiar liquid always found in health over that region; and, therefore, where this is dry it is an important sign of sickness. The thickness of the glandular layer measures about one or one and a half centimeters.‡ Between the glands are seen masses of sudoriparous glands and the voluminous bulbs of some hairs, these being always accompanied with very large sebaceous glands.

The superior lips of the *goat* and sheep is divided by a deep fissure into two parts.

That of the *pig* but little distinct from the *snout*, ends by an anterior point.

The lips of *carnivorous* are hairy, and furnished with *tentacles*. There exists also, as in the goat, a vertical fissure.

* Levator labii superioris alverque nasi of Percivall.
† Dilatator naris lateralis of Percivall.
‡ From about half to three-quarters of an inch.

EDITORIAL.

FALSE PROFESSIONAL REPRESENTATION.

Our people are ignorant of the importance of Veterinary medicine; our science is yet, and will be for years to come, in a low social standing. These are, undoubtedly, the impressions that the ordinary practitioner will put to himself when thinking of the condition of the profession in the United States. That there is much truth in these sad words no one will deny, but we think that they are exaggerated.

No, we do not believe our people entirely ignorant of our usefulness or of our importance. No, the science will not for years to come remain at a low social standing.

For a number of years our professional position has placed us in the condition to see, watch and observe what was the true standard and appreciation of the Veterinarian by Americans, and we are satisfied that though it has made only small progress, though the improvement has been slow, still there is no doubt an elevation in the estimation of the people of the Veterinarian, and the gentleman of education receives now nearly a full and proper recognition from its employers.

To the establishment of Veterinary schools we are certain this is due, and to the sending off of *well deserved graduates* we attribute much of the improved condition of the profession. In fact the time is fast coming when the necessity of a diploma, or of a lawful credential, will be indispensable to one who intends practicing. But we feel at the same time our duty to protect, from the beginning, the too confident stock owner against a class of impostors which are likely to rise, who, in fact, are already in existence—to a class of individuals who, too lazy or too ignorant to complete their studies, or who have been rejected at their final examination, at the time of graduation represent themselves as students, as graduates of such college, or of such a school. We have heard people say, "Mr. So-and-so praticed in our part of the country. He is one of your graduates, one of your pupils;" and often it has turned out that the person referred to has been either a rejected candidate for graduation, a student of one year's standing, or, as in a recent case, one of whom we know nothing about.

Now, we might excuse a person to employ Mr. So-and-so, who says that he is a graduate of the Royal Veterinary College, of Dub-

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Now, we might excuse a person to employ Mr. So-and-so, who says that he is a graduate of the Royal Veterinary College, of Dub-

lin (?), or is a pupil-graduate of Prof. (?) Ferguson, of England, or student of a Homeopathic Veterinary College (?), basing our excuse on the fact that it may be of some difficulty to ascertain that there is no such a thing as a Veterinary College in Dublin, that Prof. (?) Ferguson, of England, has no right that we know of to grant Veterinary diplomas, and that there is no Veterinary school where homeopathic Veterinary medicine is taught; but the same does not hold good when the case relates to an American degree, as Veterinary schools are but few yet on our continent, and it is very easy to ascertain the validity of the claimant's credentials; and not only do we advise our horse and cattle owners to satisfy themselves of the truth regarding the graduation from such or such an American school, but we do think it is the duty of any and all members of the profession to prosecute any individual who so falsely represents himself as one of the members of the Veterinary profession.

We received lately a letter which gives a reason for the above remarks. A certain gentleman, representing himself "*as a graduate of 'YOUR' College, has been successfully practicing as a Veterinary surgeon, winning for himself a* VERY *large practice, and being a credit to the school, though only an assumed graduate. In fact, he has raised the standard of the American schools in the mind of the public in the vicinity.*"

Up to there all is bright; the gentleman flies under false colors; he has obtained a very large practice; he has raised the standard of the American schools. Still, he does not value them as much as the public does, and though his practice must have brought him means, he does not wish to relieve himself of this cloak of imposture until——Let us continue the letter: "*About a year ago a graduate of Toronto School came and commenced practice . . . . and to increase it has lodged against the other* (the former) *information for unlawfully annexing V.S. to his name.*" And now comes the supposed means of obtaining remedy—"*You are the only person that can help him over this difficulty by* KINDLY *sending him a* SEEMING *duplicate of a degree which he appeared to have taken in* 1870*—he pretends to have lost the original—for which he will be willing to pay you any reasonable amount.*"

Of course no notice was taken of the letter as far as an answer was concerned, and it would have been thrown into the waste basket as merely the conclusion of a shameful comedy, but the end of the letter, and the name attached to it, were so surprising to us that we could not refrain from saying a word of advice to the writer—"*I assure you I would not ask you to do this if Mr. X. was not competent to practice Vet-*

erinary Surgery; and if it is of any use, he can get all the medical men of the place to certify to his abilities.

"Yours,

"Dr. ——— M. R. C. S. L., R. C. P. Edinb."

Dr. ——— M. R. C. S. L., R. C. P. Edinb., has made a sad mistake as a gentleman and a professional man; and let him repair it by advising his friend to enter a Veterinary School, which he never has done before, and obtain by his abilities, if he can, the degree which he needs so much now, or to drop his mask and keep on his successful practice under the proper footing, that of self education. There will be less shame, more pride perhaps, and it will not cost him *any reasonable amount.*

To prevent the possibility of similar imposition we publish to-day a list of the graduates of the Veterinary Schools, of N. Y. City since 1864, and will gladly insert in our next the list of the graduates of any other regular school which may be forwarded to us, with hope that some of our exchanges will publish the same list, and thus protect our country people.

MICROSCOPIC CONDITION OF THE BLOOD.

The microscopic condition of the blood in different forms of diseases has been lately so much the subject of scientific observation and studies, and is yet so much investigated by modern physiologists and pathologists, that the contribution sent to us for publication in the REVIEW, by Mr. F. S. Billings, from Berlin, will be found of much interest by our readers.

Illustrated by a photograph engraving, the different microscopic living bodies, represented by various species of bacteria, which are to be observed in the blood of an animal which has died from septicaemic poison, anthrax, rabies, puerperal fever, rinderpest, glanders, etc., are illustrated, and will be easily recognized by the observer under the microscope.

Whether these organisms are the causes or the effects of diseases (at least for some), is a point which yet remains under European discussion. M. Pasteur, the illustrated investigator, has already stated that anthrax is due to the presence of the bacteria known as baccillus anthracis, and in a recent paper before the Academie des Sciences in Paris, has refuted the experiments made by Mr. P. Bert, which had a

tendency to prove that anthrax was not due to the presence of the bacteria.

We take advantage of the articles found in our exchanges upon this question to present our readers with the result of the experiments of both Messrs. Bert and Pasteur.

UNITED STATES VETERINARY MEDICAL ASSOCIATION.

The Fourteenth Anniversary Meeting of this Association will take place on the third Tuesday of this month, the 18th inst., and will be held at the American Veterinary College. These annual gatherings have been always well attended, and as some important actions relating to Veterinary education, and other matters connected with the profession will be discussed, there is no doubt that a good number of the members of the Association will meet together on that day. We hear of a project being started for the formation of an Alumni Society of the American Veterinary College. This would be a good opportunity to lay its foundation. The first of its kind on this continent, much good might be derived from it socially and professionally.

EXTRACTS FROM FOREIGN JOURNALS.

By A. Liautard, M. D. V. S.

ON THE IDENTITY OF ANTHRAX IN ALL THE SPECIES OF DOMESTIC ANIMALS.

By M. H. Bouley, Member of the Institute, Etc.*

I ask of the Academy the permission to present in this paper, on some points, the character of the anthrax fever of domestic animals, so as to show that this popular name, preserved in science because it is the expression of a physical fact, very characteristic and constant—the deep, dark coloration of the blood—this name, I say, applies not only to a number of different diseases, collected under a common name, but to a single disease, identical to itself in all the species, and already well identified by clinical observation.

* Extract from the Minutes of the Academie des Sciences, of Paris, May 7th, 1877.

This paper will give me the opportunity to present to M. Pasteur —taking the point of view of clinic—some of the difficulties of the complex problem, the experimental solution of which he proposed to settle.

From the end of the last century, direct observation had already established the fact that, under the diversity of the symptomatic forms that the disease may assume in the different species, and in each one individually, according to the organisms which it may attack, anthrax constituted a morbid state, always identical by itself, and that, consequently, under its name a certain number of diseases, apparently distinct, ought to be classified, though, in the nosography established by old practitioners they had received very different denominations, exclusively based upon the differences of symptoms under which the unity of the essential disease had not been recognized. As many pre-eminent symptoms by which anthrax may exhibit itself, even upon individual subjects, as many names were given, so as to imply the existence of as many distinct diseases.

To Chabert, the second Director of the Alfort School, is due the merit to have detected the character of family which existed between them all, through the diversity of their external appearances; and to have observed that, in fact, the *glossanthrax*, *tongue-evil*, *black quarter*, *black leg*, *splenic apoplexy*, constituted but one disease, one in all, which could give rise to various symptoms according to the region where local lesions would manifest themselves. Indeed, one may understand that when the carbuncular congestion takes place in the pharynx, and is exhibited by symptoms of strangulation, which brought to that form of malady a special name, its characters would differ much from those it would present when the diseased group would be located inside of the thigh or in front of the chest.

For Chabert, and many after him following its teachings, the unity of anthrax, in all the species and in all individuals, under the diversity of its forms, was the result of the constant and common existence of a certain number of symptoms and anatomical lesions.

The suddenness of its apparition, its rapid march, its almost inevitable fatal termination, these are the first common characteristics of all carbuncular affections—characteristics which may be unheeded when anthrax is only sporadic, but which become very significant when it is enzootic in localities where *telluric* conditions exist. In these cases, the repetition and the rapidity of its attacks are characters by which it is easily recognized under whatever form it may present itself.

There are species, as the ovine, which offers so little resisting

powers to carbunculous infection, that it suffices in a few hours for the disease to run its different stages, and to end by death, without giving time to any local manifestation, such as tumors or cutaneous eruptions, to develop themselves.

In others, anthrax may also assume such intense form of general troubles that no local evolution can take place. But there are cases, especially in the equine and bovine families, where, to the general phenomena of anthrax, local symptoms are added, which establish between it and eruptive diseases a certain resemblance. These phenomena consist in external phlegmonous developments in different regions of the body, under the shape of peculiar tumors, which ordinarily increase very rapidly, and soon become crepitant and fade away.

It is remarkable, that from the moment these carbuncular tumors make their appearance, the febrile state diminishes, and a certain improvement is observed, as if a removal of the morbid elements had taken place from the blood by which it was saturated. There is some possibility, then, that the patient may recover, either that by potential or actual cauterization the carbuncular tumors be destroyed, or, what is rare but possible, that they be eliminated by a natural process.

But when the tumor keeps on its natural progress, or—and that too often, though the most energetic means had been employed to contest its development—if the febrile conditions temporarily suspended should rise again, then the disease assumes again a rapid course which soon ends by death. It is rare to see, through critical phenomena towards the intestinal or urinary apparatuses, the disease assumes a favorable termination.

This series of symptoms define very plainly these diseases or, to speak better, the anthrax fever, and gives it a distinctive and characteristic form.

But there is another fact more significant yet, it is the contagion which gives to anthrax its character of unity, and places it as a morbid species completely distinct from all other diseases with which it might have some symptomatic resemblance, as, for instance, the general diseases produced by a putrid infection. Anthrax is transmissible by inoculation to sheep, horse, cattle, swine, even dog, though with more difficulty, and with too much certainty to man.

It is not only through inoculation that it can be transmitted. Clinical and experimental facts prove its possible transmission through the atmosphere to herbivorous animals of ovine, bovine and equine species, even to swine. No doubt contagion through this medium is not so cer-

tain in its effects, and is less constant than by inoculation. Therefore, anthrax is not susceptible, like truly infectious diseases, to extend itself to long distances from its points of origin, increasing in strength as it travels on. On the contrary.

But if its infectious properties are weak and diminish as it goes on, they exist nevertheless, and must be taken in consideration to the point of view of practice, and of the interpretation of facts.

Anthrax leaves in the cadavers, in all species, uniform and constant marks which though not exclusive to it, are not without significance in the localities where the disease exists, and which are sufficient to characterize it objectively, and to allow to affirm its existence.

These marks, left upon the cadavers, are in first line the black color and diffluent conditions of the blood, which has the appearance of melted pitch. All the tissues show by their darkened shades, and by the dark spots which are found even in the deepest, this double character of the blood, its color and diffluency. They have besides become very putrescible. But if all the tissues carry with them this *carbuncular impression*, there are some that can be considered as selected spots of the anthracid lesions—these are the spleen and the lympathic glands.

The frequency of carbuncular congestion upon the spleen is such that Tessier took this microscopical character as foundation to give the disease in sheep the name of *splenic apoplexy*,* under which it is known to-day. But this character is not exclusive to the anthrax of sheep; it is found also in other species, and often enough to be authorized to consider it as one of the attributes of anthrax. In all species, indeed, the spleen of animals which have died of anthrax is considerably increased in size, irregularly embossed on its surface, and its softened substance transformed into a kind of mud of a dark color, resembling India ink. It is only by exception that this character is missing.

For the lymphatic glands, and specially those of the abdomen, they are tumefied, by a bloody congestion of their tissue, and an infiltration of their network by a considerable quantity of citrine serosity. The cellular tissue surrounding them is the seat of the same infiltration.

Such is the general character of anthrax, observed and studied with the means of the simple observation. From this, it results, that clinical facts, far from being contradictory to those given by perfected observation, are, on the contrary, in perfect accord with them. The discovery of the parasitic nature of anthrax confirms, indeed, what the old observation had learned upon the unity of this disease in all the species, and gives its explanation in exposing the active being from which anthrax

* Sang de rate.

proceeds, in placing it at work in the different organisms, and making it produce its effects. That is one of the most important facts to the point of view of all contagions, as what is exposed for one authorizes us to admit, by analogy of manifestation, that in the others the conditions of development are identical.

Admitting that contagion is the most essential distinctive characteristic of anthrax, and knowing the agent-instrument of its transmission, M. Pasteur, it seems to me, has given a perfectly exact definition of the disease, where he defined it by this agent itself, the bacteridie, which is found in all species identical to itself, by the properties it possesses, from whatever species it may proceed, to develop in all anthrax, characterized in each one respectively by its proper symptomatic conditions.

Now that, thanks to the researches of M. Davaine, who, the first, as M. Pasteur has so well shown, has discovered the corpuscles of anthrax, and has assigned to them their duty as exclusive agents of virulency—thanks, also, to the labors of M. Koch, of Breslau, and at last to those of M. Pasteur—now, I say, that the carbunculous virus has taken form, that it can be seen and put to its work of fecundation in the vases where it is cultivated, important researches remain to be made to give the interpretation of all the facts met in practice.

If, as proved by the observation, anthrax finds the conditions of its development in damp localities, when excessive hot weather, following heavy rains, give rise to fermentation in stagnant water, marshy lands, etc., it is probable that these conditions are favorable to the reproduction of the bacteridies from which anthrax proceeds, and that animals living in these localities absorb them, either in perfect state or in the state of spores, and are thus infected. The etiology of anthrax will be complete only when microscopic researches made in the infecting localities will have shown these carbunculous bacteridies there, and shown them at work in the development of these local epizootics that old practice named spontaneous, ignorant as it was, of the condition of their genesis.

It has been said in the above symptomatic exposé that anthrax, in one of its forms, in the large species, showed itself by external congestion, giving rise to tumors, after the apparition of which the general symptoms would improve and even disappear, if these tumors became spontaneously the seat of an expulsive inflammation, or if they were destroyed by deep cauterization.

This practical fact differs much from the experiments of inoculation, which proves that it requires but a very small drop of liquid loaded

with the vibrious of anthrax to produce the general infection of the body followed by consequences most unavoidably fatal. How, in an organism infected by natural absorption, and in which the general infection is arrested by an intense symptomatic fever, can all the bacteridies, at a given time, collect together in the external regions, so that, if they are destroyed at these points, the whole organism is freed of them and health returns? Here is a fact which agrees with difficulty with the activity of the reproduction that experiments have proved to be one of the attributes of the bacteridies.

Here is another fact, whose interpretation is not without being embarrassing, or, at least, seems so. Experience proves that when a flock of animals emigrates from localities where anthrax prevails, to others where the condition of its development do not exist, the number of the sick gradually diminishes, and soon the disease disappears. The influence of the surroundings seem, then, necessary from these facts, so that the bacteridies naturally introduced into the organism of the sheep subsist in them, and give rise to the disease which is the expression of the manifestation of their special activity; and, nevertheless, bacteridies inoculated to the sheep, outside the influence of these surroundings, do not remain inactive; they produce their effects, even with an extreme intensity. Why such difference?

The question of the infection requires also further examination. Anthrax is transmissable at a distance; it can rise from the trenches where carbuncular cadavers are buried. How does that transportation take place?

If I present these different questions, it is not that I desire to protest against the correctness of the conclusions derived from the experiments of the laboratory. I believe that they throw a great light upon the nature of anthrax, and upon the conditions of its manifestations. I believe, also, that to the general point of view of contagious diseases, they are of principal importance. When the subject of anthrax, whose virus is to-day recognized and known, will have received all the solutions that the problem of practice presents, this complete study of a disease so powerfully virulent and, in a certain measure, infectious, will not fail to throw light also upon the other contagious diseases.

For this reason I have thought proper to call attention to these different points. The nature of anthrax being now known by the experiments of the laboratory, the contradictions between their results and the practical facts cannot be fundamental, certainly they are so only in appearance. Subsequent researches will not fail to unite them, and

personally I have the greatest confidence that M. Pasteur, with the certainty of its judgment and of its methods, will succeed in solving all the difficulties of the complicated problem whose solution he has undertaken.

THE USE OF OXYGEN AT HIGH PRESSURE AS MEANS OF PHYSIOLOGICAL INVESTIGATION—VENOMS AND VIRUS.

By M. P. Bert.*

Some years ago, I announced that oxygen at high pressure produces the rapid death of all living bodies, or to specify better of all anatomic elements, whether isolated as it happens for the blood corpuscles and microscopic bodies, or grouped as the constitutive tissues of complex organisms. Specially observing the numerous phenomena known as *fermentation*, I established that all those whose condition of development was the presence of a living body (putrefaction, acetification of wine, alcoholic fermentation), were definitively arrested by the action, even transitory, of compressed oxygen, while all fermentations due to the action of a dissolved matter (diastasis, pancreatine, myrosine, emulsine,) resist perfectly that influence.

This new method of analysis, I already stated, may be usefully applied to the study of physiological problems. The carbunculous blood, that of the infectious diseases, the pathological fluids, virus, venoms, do they owe their action to corpuscles analogous to the true ferments, or to an alteration of the liquids acting as a diastasic ferment? The results observed after the sojourn in compressed oxygen will throw on this question new light.

Some of these results I beg to present to-day to the Academie.

Ripening and Mellowing of Fruits.—Experience proves that after a stay of several hours in compressed oxygen, fruits whose ripening can become perfect when off the tree, are indefinitely preserved, but ceased the process of ripening; while those which are susceptible of mellowing undergo this process even when in compressed oxygen, and this faster than when exposed to ordinary free atmospherical air. It is thus demonstrated 1st. That ripening is the result of a cellular development; 2d. That mellowing is due either to the action of a soluble ferment, at first developed by the cells of the fruit, or to a direct oxydation of peculiar substances.

* Extract from the Comptes rendus de l'Academie des Sciences, Paris, May 21st, 1877.

VENOMS.—I have experimented upon the venom of the scorpio. This either liquid, dry or redissolved in water, resists perfectly the action of compressed oxygen. We know, anyhow, that venoms owe their action to chemical substances analagous to vegetable alcaloid.

VIRUS.—1st. *Vaccine and Glanders.*—The study of virus is evidently much more interesting. I begin it by vaccine and glanders. Fresh vaccinal liquid exposed for more than a week to the influence of oxygen to the highest pressure (corresponding to about 50 atmospheres of air), had kept all its power. Pus from glanders, placed in the same condition, killed rapidly horses inoculated with it. More than that, compressed oxygen having destroyed all the living agents, which would give rise to their putrefaction, these virus have been preserved in full activity for a long time, in the middle of the heat of summer.

Consequently, neither glanders nor vaccine owe their virulent properties to living beings or cells; that there is an agent which by this character approaches the diastatic substances.

This conclusion does not seem to contradict with the experiments by which M. Chauveau proved that the virulent action of the virus of vaccine or glanders exists in the corpuscles they hold in suspension.

It is possible that the toxic produce be in that peculiar state of precipitation; or that, though dissolved, it impregnates exclusively these little bodies, as the hematocristalline of the blood, so soluble in the serum, attaches itself exclusively upon the globules.

But it is certain that these corpuscles—vehicles of the virulency—are no living bodies, and that they do not act as such in the organisms where they are inoculated.

ANTHRAX.—From the investigations of M. Davaine, pathologists have accepted the idea that anthrax is due to the development in the blood of myriads of little bodies named *bacteridies;* there would be a kind of microparasitic disease, or, better, a kind of ultra-sanguineous fermentation producing death.

But the use of compressed oxygen does not seem to sanction this.

Indeed, carbuncular blood, placed in thin layers to elevated pressure of oxygen, had preserved its virulency, as manifested by the death, for several successive generations, of the Guinea pigs which were inoculated; but the blood of these animals did not contain any bacteridies.*

But before stopping to conclusions in such a matter, the subject of so much controversy, I desired to try an entirely different method, and

* On account of the difficulty in obtaining the blood of animals who had died of anthrax, this experiment was made only once.

proceeded as follows: Blood from carbunculous animals loaded with bacteridies being sent to me by M. Trasbot, of Alfort, I added to it, drop by drop and carefully, absolute alcohol, so as to increase the volume of the original liquid to four times its quantity; I filtered the thick mass and dried quick in a vacuum the coagulum well washed with alcohol. A small piece of this dry matter, introduced under the skin of a Guinea pig, killed it in less than a day; its blood produced death in another, and even in a dog; and that evident virulency existed for several successive generations, the Guinea pig being, so to speak, used as soil for the cultivation of the virus, and the dog as the means of testing it: and, however, this virulent blood did not contain bacteridies since the mixture with the alcohol.

I will go further: the alcoholic precipitate being washed off with water, I found that this liquid carries with it the virulent principle, which can be precipitated again by a new addition of alcohol. But I must say that these successive washings diminish the intensity of the virus, as the last one failed to kill dogs, and even Guinea pigs did not succumb beyond the third generation.

From these experiments we must conclude: that it exists in the carbunculous blood a toxic and virulent element, which resists the action of compressed oxygen and of alcohol, and that it can be isolated like the other diastasis. This is an important fact upon which I desire to call attention. Now, is this element condensed upon the bacteridies themselves? Was it formed at the onset, secreted, so to speak, by the bacteridies, and should it have a property, yet unknown to produce of secretion, that of multiplying upon the living body? Would its virulency be something else than the bacteridies, so that the carbunculous blood would possess two causes of death? These are so many questions that I am studying.

REMARKS RELATING TO THE EXPERIMENTS OF M. BERT UPON ANTHRAX.

By C. Davaine.*

From recent observations of M. Bert, anthrax may exist and spread without the presence of the filiform bodies that I have named bacteridies, which then would not be the virulent agent of the disease.

To prove such an exceptional fact, I think it would have been necessary to show that the blood deprived of bacteridies had all the other known properties of carbunculous blood.

* Presented by M. Pasteur to the Academie des Sciences, Paris, June 4th, 1877.

This proof was so much more necessary that numerous discussions had already taken place, even before the Academie, because experimenters had always mistaken anthrax with another contagious affection—septicaemia.

M. Bert has made two different experiments, one with compressed oxygen, the other with absolute alcohol. Not having repeated the first, I cannot say anything of it; but the second I have made several times over, some years ago, and have obtained results entirely opposite to those of M. Bert. When I began investigation on these questions, I went to work like M. Bert coagulating the blood with alcohol and introducing the *magma* under the skin. The animals died, not of anthrax, but of septicaemia.

After finding that one millionth of a drop of carbunculous blood was sufficient to kill a Guinea pig, I made the two following experiments (9th of August, 1873):

1st. I took some blood of an animal who had recently died with anthrax, consequently free of all putrefaction, and mixed it with 1,000 parts of water. A part of this fluid was then mixed in 10 parts of ordinary alcohol. After half an hour, with the needle of Pravaz, I injected one drop of this mixture under the skin of a Guinea pig. He continued to enjoy a perfect health.

2d. A second experiment gave the same result, though the contact of the virulent liquid with the alcohol did not last more than two minutes.

Still in these two experiments, one ten thousandth of a drop of carbunculous blood having been injected, both animals ought to have died if the virus had not been destroyed.

Therefore, if alcohol destroys the virus of carbunculous affection, M. Bert has not produced this disease in the animals he successively inoculated. But the results he has obtained are explained by the method of inoculation he had employed, and to the dangers of which I have already called attention.

When a putrescible substance, carbunculous or not, is introduced under the skin by a wound which remains open, most generally the animal dies with septicaemia, contagious disease like anthrax, but not identical to it and different from it by one of its distinctive characters —the absence of bacteridies.

The same cause of error has existed in the first experiment of M. Bert. Still I must repeat in this occasion that the degree of septicity of the putrified blood is not in proportion to the intensity of its odor. In some conditions this odor may be slight, and still the virulency ex-

cessive. I have seen, in a certain number of experiments, healthy blood, placed in not compressed oxygen, take a peculiar odor which was not that of putrefaction, and still when inoculated in quantity smaller than a drop, to kill rapidly by septiaemia.

Then, if this blood thus placed in oxygen had been carbunculous, as putrefaction destroys its special virulency, as I proved it, one would have produced by inoculation with it, not anthrax, but septiaemia.

I mention these results, not to come to any conclusion of the not compressed to the compressed oxygen, but to call attention to facts which may have some importance to the point of view of the effects of compressed oxygen upon carbunculous blood.

I will now add a few words relating to a question of Mr. Bouley upon the pathogeny of some forms of anthrax diseases.

The observations and the experiments I have made upon this subject have allowed me to establish that the *pustula maligna* form, almost special to man, is produced by the introduction of the virus under the epidermis, in the reti mucosum of the skin, and that the sub-cutaneous tumors, so common in horses, are produced by the introduction under the teguments of a fraction of a drop of infected blood. I have shown how flies may, in the country, become the true agents of these two modes of inoculation.

Carbunculous fever without external manifestation appears, when substances impregnated with virus are introduced in internal organs. As for the tumors, called *critical*, which develop themselves during that febrile disease, and as an effort of the medicating nature which carries the virus under the teguments so as to expel it, I have never observed anything like it. In my opinion, it is an old error, due to a false interpretation of the course of the disease. Indeed, the bacteridies, motionless, cannot spontaneously quit the organs to go in a fixed region of the body; and, besides, the economy of the patient cannot collect together these millions of small beings located all over, and direct them towards a special point of the organism.

To accept such a result, we must suppose a kind of filtration, and of a special circulation inadmissable to physiology; and to effect that it seems to me certain that these, so-called, *critical* tumors were primitive, and not consecutive to the invasion of the disease; they are formed where the virus has been introduced from outside, and it is because they remain yet localized that the surgeon will sometimes cure them.

REPORT OF CASES.

TYMPANITIS TREATED BY PUNCTURE.

On the 1st of August, at 4 P. M., I was called to see a sorrel horse, 8 years old, one of a team used in an ice wagon. I found he had been sick about two hours, and two antispasmodic draughts had already been given, but he had now commenced to swell rapidly. I was, therefore, sent for. I administered spt. am. ar., sodæ sulphis a. a. oz. j.; also gave enemas occasionally. I repeated the medicine; still no improvement; I then gave calx chlorin, oz. ss. in solution. 6 P. M.—Pulse, 75; very feeble; mucous membranes very much congested, and of a purple hue; abdomen distended to its utmost capacity; respiration performed with great difficulty; body and extremities covered with a cold perspiration; mouth clammy; walking round his box, he now threw himself down and rolled over in one corner of his box; he struggled, but was unable to get up; I had him pulled out, and lifted him up; he now stood still for ten minutes, gasping for breath; the tongue and mouth almost black; he again commenced wandering aimlessly around the box. I saw, unless he had immediate relief, it would be too late; I therefore decided to use the trocar. I had him led into the corner of the box; I chose the right side; the most prominent part was six inches to the antero-inferior part of the anterior spine of the illium; I did not put the animal under any restraint, or divide the skin, but drove the trocar into the distended intestine; as soon as I withdrew the trocar the gas rushed out with a hissing noise; in about two minutes the abdomen resumed its natural size; I then withdrew the cannula; the horse did not move during the operation, but gave a sigh of relief as the gas escaped. I now had him well hand-rubbed and blanketed; also gave him a diffusible stimulant; he did not move a step in six hours; he then rallied and took a mash; being so much exhausted, it required a week's rest before he was able to resume work; the wound healed by the first intention and he is as well as ever.

C. BURDEN, D. V. S.

STATISTICS.

STATISTICAL REPORT,

Regarding Malleus humidus et farciminosus in the Kingdom of Prussia, for the last three-quarters of the year 1876, from the Report of the "Technischen Deputation fur das Veterinair wesen," by Virchow, in his Archiv, Vol. 67, No. 2.

	2 quarters.	3d quarter.	4th quarter.
Number of invested districts.....	119	202	180
" " villages.....	406	451	338
" " farms or stables..	457	552	416
" horses in invested places..	4,235	4,918	3,505
" diseased.....	949	878	592
" which died.....	47	45	21
" " were officially killed.	736	691	436
" " " killed by owners	89	76	79

From the above, it will be seen that 2,419 horses were reported as diseased, and that from this number died..... 113
Officially killed..... 1,863
Killed by owners, without compulsion..... 244

Total..... 2,220

Virchow says, in his remarks, that the above is a striking proof of the carrying out of the new law relating to contagious diseases in animals, and that it is also a comforting assurance of a lessening of one cause of danger to human life. It will be observed that there is a decrease in the number reported and killed each quarter, and this decrease must be accredited to the executive force of our Veterinary police system. Regarding the contagium of this disease, Virchow says, that I have held to the opinion that the contagium of glanders is of a fixed nature. The conception of its volatile nature is widely outspread, and many facts are, it must be acknowledged, in support of such an idea. But the above table confirms him in the view of the fixidity of the contagium, a view which he has held for a long time (Spec. Path. u Thrapic Erlaugen, 1855, Vol. 2, Page 410), viz.: "that the validity of the contagium of glanders has not been sufficiently proven."

F. S. B.

LIST OF GRADUATES

OF VETERINARY MEDICINE, FROM SCHOOLS LOCATED IN NEW YORK CITY.

J. L. Robertson, M. D.,	New York City, N. Y.	Graduated	1867.
E. Nostrand	" "	"	"
Ch. Burden	" "	"	1868.
L. T. Bell	Brooklyn, "	"	1871.
Pet. Nostrand	Williamsburg, "	"	"
R. W. Finlay	Harlem, "	"	1873.
Peter Peters	Richmond, Va.	"	"
J. D. Hopkins	New York City, N. Y.	"	"
C. Michener	Carversville, Pa.	"	1874.
C. H. Stocker	Salem, Mass.	"	"
J. Myers, Jr	Cincinnati, Ohio	"	"
Ph. Fernsler	Lebanon, Pa.	"	"
*B. Herr	Martinsville, Pa.	"	"
W. Dougherty	Baltimore, Md.	"	"
E. Traver	Rhinebeck, N. Y.	"	1875.
J. B. Cosgrove	Worcester, Mass.	"	"
R. P. Blakely	Syracuse, N. Y.	"	"
Theo. Outerbridge	Bermuda, W. I.	"	"
A. A. Holcombe	New York City, N. Y.	"	1876.
J. S. Saunders	Boston, Mass.	"	"
C. W. Crowley	Springfield, Ill.	"	"
J. C. Corlies	Newark, N. J.	"	"
W. J. Coates	New York City, N. Y.	"	1877.
C. H. Peabody	Providence, R. I.	"	"
C. H. Hall	New Bedford, Mass.	"	"
G. I. Penniman	Worcester, Mass.	"	"

* Deceased.

VARIETIES AND NEWS.

CATTLE PLAGUE IN GERMANY.

Recent outbreaks of cattle plague at Beuthen, in Silesia, is reported, and exportation of cattle from that part of Germany is prohibited. All cattle brought to Berlin are ordered to be slaughtered on the spot. At Hamburg, and other ports, measures are also taken to prevent the exportation of diseased cattle.